

**Project Title:** Model Based Engine Efficiency

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Internal Combustion Engines have become more refined since their first appearance in automotive applications. A modern engine has sensors, actuators and controllers added to the standard internal combustion engine in order to achieve higher levels of fuel economy and lower emissions while still retaining a desirable level of performance.

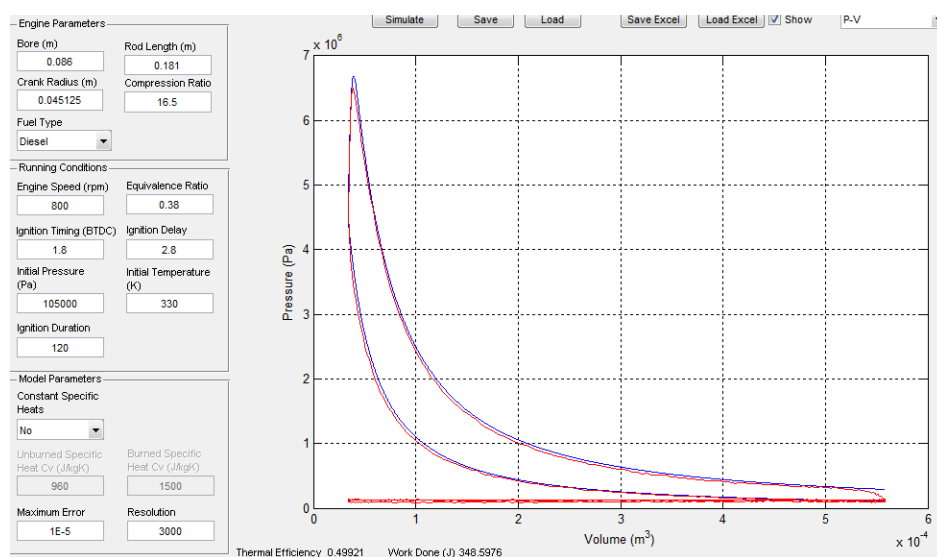
Much of the details of combustion are still not well understood, prompting fundamental investigation. Furthermore, to further perfect internal combustion engines and implement future technologies, a deep understanding of the underlying principles is required, in order to intelligently specify the requirements of said future technologies.

Currently two main branches of internal combustion engines exist, that of the spark ignition, and that of compression ignition engines. The latter has not been as common in road vehicles until recent years. This increase is particularly pronounced in European markets.

Without any clear indication of which is the definite way forward until Zero Emission Vehicle (ZEV) are a reality, one must consider both. It seems that compression ignition engines are not as well documented as spark ignition engines. This was also apparent from the lack of equal understanding by professionals in the industry. So much so, that in general, very few authorities of the internal combustion engine exist. The best known in the field is Heywood, John B.

The author therefore proposed to develop a set of tools to model internal combustion engines including the often omitted compression ignition engines. This would provide a foundation for further investigation of other current and future technologies such as variable valve timing.

The aims of this investigation, in a simpler sense, where to understand a wide number of topics related to combustion. Apply this knowledge in a useful manner for the author and others in the future, who might require to understanding internal combustion engine from a scientific perspective. This was set to be in the form of a simulation package.



**Figure 1 - Simulation Model Created by the Author**